Complete Summary

GUIDELINE TITLE

ACR Appropriateness Criteria™ for suspected cervical spine trauma.

BIBLIOGRAPHIC SOURCE(S)

American College of Radiology (ACR), Expert Panel on Musculoskeletal Imaging. Suspected cervical spine trauma. Reston (VA): American College of Radiology (ACR); 2002. 8 p. (ACR appropriateness criteria). [39 references]

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Suspected cervical spine trauma

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Emergency Medicine
Neurological Surgery
Neurology
Orthopedic Surgery
Radiology

INTENDED USERS

Health Plans
Hospitals

Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for suspected cervical spine trauma

TARGET POPULATION

Patients with suspected cervical spine trauma

INTERVENTIONS AND PRACTICES CONSIDERED

1. Plain films
    - Anteroposterior (AP)
    - Lateral
    - Open mouth
    - Obliques
    - Flexion/extension
2. Computed tomography (CT)
3. Computed tomography myelogram
4. Magnetic resonance imaging (MRI)

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of recent peer-reviewed medical journals, primarily using the National Library of Medicine's MEDLINE database. The developer identified and collected the major applicable articles.

NUMBER OF SOURCE DOCUMENTS

The total number of source documents identified as the result of the literature search is not known.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus (Delphi Method)
Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement in the formulation of the Appropriateness Criteria. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty (80) percent agreement is considered a consensus. If consensus cannot be reached by this method, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

Because of concerns of cost and radiation exposure, investigators have been studying methods of improving selection of those patients who truly were at risk and needed radiographs or other imaging. The first such paper to address these

issues was by Vandemark in 1990. He proposed a set of guidelines to identify patients at high risk for having a cervical spine injury. More recently is the study by Blackmore and colleagues at the University of Washington, who developed a new set of guidelines (decision rule) for the use of helical CT. In addition to this, they also performed a cost-effectiveness analysis of using helical CT in trauma patients. The most significant study in this respect was that by Stiell et al. Stiell was the lead investigator in formulating what is now accepted as the "Ottawa Rules" for selection of patients for ankle and knee radiography in the trauma setting. In a multi institution study, they present the "Canadian C-spine Rule" (see original guideline document) for selecting trauma patients for cervical radiography. The guidelines proposed by each of these studies are listed in the original guideline document under Supplementary Recommendations.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria and the Chair of the ACR Board of Chancellors.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Clinical Condition: Suspected Cervical Spine Trauma

Variant 1: Adult: asymptomatic and alert, no cervical tenderness, no neurologic findings, no distracting injury, with or without cervical collar.

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth	2	
AP, lateral, open mouth, obliques	2	
AP, lateral, open mouth, obliques, flexion/extension	2	
CT	2	
MRI	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9		

Radiologic Exam Procedure	Appropriateness Rating	Comments
1=Least appropriate 9=Most appropriate		

Abbreviations: AP, anteroposterior; CT, computed tomography; MRI, magnetic resonance imaging

Variant 2: Adult: asymptomatic and alert now, history of unconsciousness, no neurologic findings, no distracting injury.

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth	2	
AP, lateral, open mouth, obliques	2	
AP, lateral, open mouth, obliques, flexion/extension	2	
CT	2	
MRI	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Variant 3: Adult: alert, cervical tenderness, no neurologic findings, no distracting injury.

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth	9	
AP, lateral, open mouth, obliques	2	
AP, lateral, open mouth, obliques, flexion/extension	2	
CT	2	
MRI	2	
Appropriateness Criteria Scale		

Radiologic Exam Procedure	Appropriateness Rating	Comments
1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Clinical Condition: Suspected Cervical Spine Trauma

Variant 4: Adult: alert, cervical tenderness, paresthesias in hands or feet.

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth	9	
CT	9	
MRI	8	Depends on CT findings.
AP, lateral, open mouth, obliques	2	
AP, lateral, open mouth, obliques, flexion/extension	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Abbreviations: AP, anteroposterior; CT, computed tomography; MRI, magnetic resonance imaging

Variant 5: Adult: alert, no cervical tenderness, no neurologic findings, fractured femur.

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth	2	Clinical evaluation to determine indication.
AP, lateral, open mouth, obliques	2	
AP, lateral, open mouth, obliques, flexion/extension	2	

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT	2	
MRI	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Variant 6: Adult: unconscious.

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth	9	
CT	9	
AP, lateral, open mouth, obliques	2	
MRI	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Clinical Condition: Suspected Cervical Spine Trauma

Variant 7: Adult: impaired sensorium (including alcohol and/or drugs).

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth	9	
CT	9	
AP, lateral, open mouth, obliques	2	
MRI	2	
Appropriateness Criteria Scale		

Radiologic Exam Procedure	Appropriateness Rating	Comments
1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Abbreviations: AP, anteroposterior; CT, computed tomography; MRI, magnetic resonance imaging

Variant 8: Adult: impaired sensorium (alcohol and/or drugs), neurologic findings.

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth	9	
CT	9	
MRI	8	Depends on CT and neurological findings.
AP, lateral, open mouth, obliques	2	
CT myelogram	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Variant 9: Adult: neck pain, clinical findings suggest ligamentous injury, radiographs and/or CT "normal."

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI	6	
Flexion/extension radiographs	2	May be of value in subsequent follow up.
CT myelogram	2	
Appropriateness Criteria Scale		

Radiologic Exam Procedure	Appropriateness Rating	Comments
1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Variant 10: Child: alert, no neck pain, neck supple, no distracting injury.

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth	2	
CT	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Clinical Condition: Suspected Cervical Spine Trauma

Variant 11: Child: alert, no neck pain, neck supple, fractured femur.

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth	2	
CT	2	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Summary

There is agreement among most investigators and this expert panel that patients who are alert, have never lost consciousness, are not under the influence of alcohol and/or drugs, have no distracting injuries, have no cervical tenderness, and have no neurologic findings, do not need imaging. Patients who do not fall into this category should have at minimum a three-view cervical radiographic series followed by helical computed tomography (CT). In certain instances, the

cervical CT examination will be performed immediately after a cranial CT while the patient is still in the CT suite. This is both time-effective and cost-effective.

Although the literature still recommends flexion/extension radiographs, it is the opinion and experience of this expert panel that they are not very helpful except for ensuring that minor degrees of anterolisthesis or retrolisthesis in patients with cervical spondylosis are fixed deformities. Usually muscle spasm in acutely injured patients precludes an adequate examination in the acute setting. Flexion/extension radiography is best reserved for follow-up of symptomatic patients, usually in 7-10 days after muscle spasm has subsided. The real issue, however, with the use of flexion/extension radiography is whether or not the patient has ligamentous instability. In those settings, magnetic resonance imaging (MRI) is the procedure of choice.

Similarly, there is agreement among the panel members that the use of supine oblique views is no longer necessary in patients who are undergoing cervical CT examination. Oblique views, although useful in patients with unilateral facet lock, were most valuable in adding two more views of the cervicothoracic junction. Both of these functions can now be accomplished through the use of CT.

Finally, there is agreement in the literature that MRI be reserved for patients who have clear-cut neurologic findings and those suspected of ligamentous instability. A recent review article goes further in recommending total spinal MRI to screen for multiple noncontiguous injuries (which occur in about 20% of patients).

See the original guideline document for supplementary recommendations.

CLINICAL ALGORITHM(S)

Algorithms were not developed from criteria guidelines.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

The original literature review for this ACR Appropriateness Criteria™ topic included the initial investigations of 5,719 patients with cervical trauma. The literature review for this revision included data on 13,534 patients. In addition, there are data from the National Emergency X-Radiography Utilization Study (NEXUS) of 34,069 patients and from the Canadian Rule group of 8,924 patients.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate selection of radiologic exam procedures to evaluate patients with suspected cervical spine trauma

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American College of Radiology (ACR), Expert Panel on Musculoskeletal Imaging. Suspected cervical spine trauma. Reston (VA): American College of Radiology (ACR); 2002. 8 p. (ACR appropriateness criteria). [39 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1995 (revised 2002)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria™.

GUIDELINE COMMITTEE

ACR Appropriateness Criteria™ Committee, Expert Panel on Musculoskeletal Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Richard H. Daffner, MD; Murray K. Dalinka, MD; Naomi Alazraki, MD; Arthur A. DeSmet, MD; George Y. El-Khoury, MD; John B. Kneeland, MD; B.J. Manaster, MD, PhD; Helene Pavlov, MD; David A. Rubin, MD; Lynne S. Steinbach, MD; Murali Sundaram, MD; Barbara N. Weissman, MD; Robert H. Haralson III, MD; John B. McCabe, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline. It updates a previously published version: Suspected cervical spine trauma. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):243-6.

The ACR Appropriateness Criteria™ are reviewed after five years, if not sooner, depending upon introduction of new and highly significant scientific evidence. The anticipated next review date for this topic is 2007.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

Print copies: Available from American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on May 6, 2001. The information was verified by the guideline developer as of June 29, 2001. This summary was updated by ECRI on May 22, 2003. The updated information was verified by the guideline developer on June 23, 2003.

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